

## PATENT ABSTRACTS OF JAPAN

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### (54) LEAD-ACID BATTERY

#### (57)Abstract:

PURPOSE: To improve corrosion resistance at high temperature of a strap in a negative electrode by continuously forming a Pb-Sn alloy layer containing high concentration of Sn, which covers the surface and its vicinity of a lug, on the lower surface of a ledge part to which the lug is connected.

CONSTITUTION: A plurality of negative plates and positive plates between both of which a separator interposed are stacked, lugs of the plates having the same polarity are connected with a ledge part, and an electrode group obtained is immersed in an electrolyte to assemble a lead-acid battery. A grid of the negative plate is made of a Pb-Ca-Sn alloy or a Pb-Ca-alloy, and the surface of the lug is covered with a Pb-Sn alloy layer containing high concentration of Sn. The Pb-Sn alloy layer containing high concentration of Sn, which covers the surface of the lug 3, is spread to the vicinity of the lug on the lower surface of the ledge part. Preferably, the Pb-Sn alloy layer is continuously formed so as to reach the adjacent negative plates on the lower surface of the ledge part.



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to improvement of the connection method of the handle part of the negative electrode plate of a lead storage battery, and a shelf.

[0002]

[Description of the Prior Art]The lead storage battery for cars has the structure which connected to six-piece series the cell which has about 2-v electromotive force which immersed the group of electrode which piled up the anode board and negative electrode plate of the required number by turns via the separator into the electrolysis solution. In such a lead storage battery for cars, in order to control reduction of an electrolysis solution in use, generally instead of the conventional Pb-Sb system alloy, the Pb-Ca system alloy is used for the anode board and the negative electrode plate.

[0003]However, electrolysis solutions decrease in number by a certain cause, if a shelf uses it in the state where it exposed from the electrolysis solution for a long time, among the straps which consist of a shelf and a connection body for connection between cells, a handle part will corrode near the weld zone of a negative electrode ledge part and a polar-plate handle part, and the phenomenon of fracturing will arise.

[0004]As the measure, the negative electrode grid which covered the handle part surface with Pb-Sn alloy which contains Sn by high concentration is used, the weldability of the alloy and polar-plate handle part which form a shelf is raised, and the method of preventing corrosion is indicated.

[0005]

[Problem(s) to be Solved by the Invention]However, the operating environment temperature of the cell for cars is rising with an engine high increase in power etc. in recent years. It has become clear that it cannot control to the corrosion resulting from the exposure from the electrolysis solution of a negative electrode ledge part by which it is generated under such hot environments even if it uses the above-mentioned conventional method.

[0006]An object of this invention is to indicate the structure of a strap which shows the corrosion resistance outstanding to the aforementioned problem.

[0007]

[Means for Solving the Problem]This invention is what gave a circular weld zone (fillet) which uses a Pb-Ca-Sn system alloy or a Pb-Ca system alloy for a negative electrode grid object, and touches the shelf undersurface and the handle part surface at a boundary part of a negative electrode ledge part and a handle part, Near the handle part, said Pb-Sn alloy layer is formed among said negative electrode ledge subordinate sides in a form where Pb-Sn alloy containing high-concentration Sn which covers the handle part surface stood in a row from the handle part surface. Said alloy layer is continuing even to a negative electrode plate which adjoins each other preferably, and said Pb-Sn alloy is formed in the whole shelf undersurface. Pb-Sn alloy currently formed in the surface exfoliates, and a handle part furthermore located in an inside of a shelf has the structure where only shape of a lattice alloy remains.

[0008]

[Function]In the composition of this invention, a fillet is given to the weld zone of a negative electrode strap and a handle part, and since the Pb-Sn system alloy which contains high-concentration Sn for the handle part surface reaches far and wide and covers the handle part surface containing a weld zone and the undersurface of a negative electrode ledge part, the corrosion under an elevated-temperature operating environment can be controlled.

[0009]

[Example]Hereafter, an example explains this invention.

[0010]The Sn alloy was used for the negative electrode grid object Pb-0.07%Ca-0.3%, and the thing in which the Pb-50% Sn-alloy layer was formed on the handle part surface was used for the negative electrode plate. The Pb-3%Sb alloy was used for the strap part which consists of the connection body 1 and the shelf 2. Six negative electrode plates, five anodes, and a separator were piled up by turns, the handle part and shelf of the polar plate were welded with the burner welding process, and the group of electrode was constituted. The appearance of the strap part after group-of-electrode composition is shown in drawing 4.

[0011]By adjusting the fire power of a burner at the time of welding, the cell B by which the Pb-50% Sn-alloy layer remains also on the surface of the handle part which entered into the inside of a shelf as the cell A and conventional example of this invention was constituted. The cross section of a cell A shelf is shown in drawing 1, and the mimetic diagram of the portion of

the cell B is shown in [drawing 2](#).

[0012]Using the negative electrode plate which omits covering by Pb-Sn alloy for the handle part surface as a comparative example, other composition created the cell C made equivalent to this invention article. The cross section of the shelf of this cell C is shown in [drawing 3](#).

[0013]By the cast one strap method which welds by making a handle part do a handstand, the structure of the strap by this invention is hard to be formed, and becomes realizable for the first time with a burner welding process.

[0014]Constant potential charge of 13.8V was performed under the basis in the state where the shelf exposed each cell of said A-C from the electrolyte level, and the environment of 90 \*\* of ambient temperature, and the cell was maintained at the overcharging condition. After continuing this constant potential charge for six weeks, the cell was disassembled and the corrosion situation in the handle part of a negative electrode grid object was investigated. The result is shown in Table 1. The ratio of the handle part disconnected [ about cell A-C ] in the weld zone using every 100 pieces by corrosion, respectively is shown in a sample.

[0015]

[Table 1]

試験電池	断線率 (%)
A	59
B	11
C	2

[0016]This table 1 shows that the corrosion resistance on cell use is improved by this invention.

[0017]When the Pb-Sn system alloy which contains in a connection body with a Pb-Sb system alloy, and contains Sn in a shelf at a rate of 1 to 3% is used, an equivalent effect is acquired by taking the same composition as this invention.

[0018]

[Effect of the Invention]By using the composition of this invention as mentioned above, the corrosion resistance of a negative electrode strap is substantially improvable.

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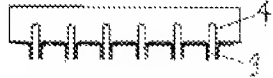
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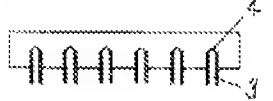
DRAWINGS

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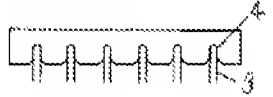
[Drawing 1]



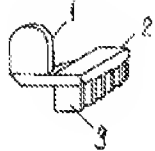
[Drawing 2]



[Drawing 3]



[Drawing 4]



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[Translation done.]